## *New Fluid for Preserving Natural-History Specimens.*

By A. E. Verrill.

In consequence of the high price of alcohol, a series of experiments was undertaken by me last year, with the view of finding a substitute for it in preserving the soft parts of animals. Among the various solutions and liquids tested were nearly all that have ever been recommended, besides many new ones. Chloride of zinc, carbolic acid, glycerine, chloride of calcium, acetate of alumina, arsenious acid, Goadby's solutions, and various combinations of these and other preparations were carefully tried, and the results made comparative by placing the same kind of objects in each, at the same time. Although each of these, under certain circumstances, have more or less preservative qualities, none of them were found satisfactory, especially when the *colour* and *form* of the specimen are required to be preserved as well as its structure.

As a test for the preservation of colour, the larvæ of the tomato-worm (*Sphinx quadrimaculata*) were used. These larvæ are difficult of preservation with the natural form and colour, nearly always turning dark brown and contracting badly in alcohol and most other preparations.

As a result of these experiments the following solutions were found highly satisfactory in all respects when properly used. By their use the larvæ and recent pupæ of the tomato-worm were preserved and still retain their delicate green colours, together with their natural form and translucent appearance, while the internal organs are fully preserved. Fishes, mollusks, various insects, worms, and leaves of plants have also been preserved with perfect success and far better than can be done with alcohol. In the case of mollusks, especially, the preparations are very beautiful, retaining the delicate semitransparent appearance of the membranes nearly as in life, with but little contraction. Another great advantage is the extreme simplicity and cheapness of the solution.

To use this fluid I prepare first the following stock solution, which may be kept in wooden barrels, or casks, and labelled:—

Solution A. 1.

| | |
|---|---|
| Rock-salt | 40 oz. |
| Nitre (nitrate of potassa) | 4 oz. |
| Soft water | 1 gallon. |

This is the final solution in which all invertebrate animals must be preserved. A solution with double the amount of water may be kept if desirable, and called A. 2. Another with three gallons of water will be A. 3.

In the preliminary treatment of specimens the following solution is *temporarily* employed, and is designed to preserve the object while becoming gradually saturated with the saline matter; for in no case should the specimen be put into the full strength of solution A. 1, for it would rapidly harden and contract the external parts and thus prevent access to the interior. Even with alcohol it is far better to place the object for a time in weak spirits and then transfer succes-

sively to stronger, and for some objects, as Medusæ, no other treatment will succeed.

SOLUTION B. 1.

| | |
|---|---|
| Soft water | 1 gallon. |
| Solution A. 1 | 1 qt. |
| Arseniate of potassa | 1 oz. |

Another solution with double the amount of water may be made, if desired, and called solution B. 2.

To preserve animals with these solutions they are, if insects or marine invertebrates, ordinarily placed first in solution B. 1; but if the weather be cool it would be better in many cases to employ first B. 2; and in the case of all marine animals, washing first in fresh water is desirable, though not essential. If the specimens rise to the surface they should be kept under by mechanical means. After remaining for several hours, or a day, varying according to its size and the weather, in the B. 1 solution, it may be transferred to A. 3, and then successively to A. 2 and A. 1; and when thus fully preserved it may be transferred to a fresh portion of the last solution, which has been filtered clear and bright, and put up in a cabinet, when no further change will be necessary if the bottle or other vessel be properly secured, to prevent the escape of the fluid by crystallization around the opening. To prevent this, the stoppers, whether of cork or glass, together with the neck of the bottle or jar, may be covered with a solution of paraffine or wax in turpentine or benzole, which should be applied only when the surfaces are quite dry and clean. The length of time that any specimen should remain in each of the solutions is usually indicated by their sinking to the bottom when saturated by it. In general the more gradually this saturation with the saline matter takes place, the less the tissues contract or change in appearance. In many cases, however, fewer changes than indicated above will be effectual. I have in some cases succeeded well with but two solutions below A. 1. For vertebrates, except fishes, the solution A. 2 will usually be found strong enough for permanent preservation, especially when the object is small or dissected. If the entire animal be preserved, when larger than two pounds in weight, it should be injected with the fluids, especially B. 1 and the final A. 1 or 2, or an incision may be made in one side of the abdomen in vertebrates, or under the carapace of crabs, &c., to admit the fluids more freely. In preserving the animals of large univalve shells, an opening should be made through the shell, at or near the tip of the spire. Mammals, birds, and reptiles should be placed first in solution B. 2 to obtain the best results. In cases where the use of the B. fluids would be objectionable, on account of their highly poisonous nature, a fourth dilution of solution A. 1, corresponding in strength with B. 1, but without the arseniate of potassa, may be substituted, and in many cases will do nearly as well, if the weather be not very hot; but the specimens in this case should be carefully watched and transferred to the stronger solutions as soon as possible, so as to avoid incipient decomposition while in the first fluids.—Silliman's *American Journal*, March 1866.